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## PART I - ADMINISTRATIVE

### Section 1. General administrative information

#### Title of project

Evaluate The Life History Of Native Salmonids In The Malheur Basin

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**BPA project number:** 9701900

**Contract renewal date (mm/yyyy):** 4/2000 ☐ **Multiple actions?**

#### Business name of agency, institution or organization requesting funding

Burns Paiute Tribe - Natural Resource Department

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**Business acronym (if appropriate)** BPT

#### Proposal contact person or principal investigator:

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#### NPPC Program Measure Number(s) which this project addresses

10.1, 10.1A.2, 10.2A.1, 10.5, 10.5A, 10.6

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#### FWS/NMFS Biological Opinion Number(s) which this project addresses

Biological Opinion Document for bull trout is currently being drafted.

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#### Other planning document references

1) Malheur River Basin Fish Management Plan, ODFW 1990; Malheur Wild and Scenic River Management Plan, USDA 1993; and 2) Interior Columbia Basin Ecosystem Management Project (ICBEMP).

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#### Short description

Evalute and determine the life history, distribution, and critical habitats pertainant to populations of redband and bull trout in the Middle Fork Malheur subbasin.

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#### Target species

bull trout and redband trout

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## Section 2. Sorting and evaluation

### Subbasin

Middle Fork River Malheur

#### ***Evaluation Process Sort***

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
<input type="checkbox"/> Anadromous fish <input checked="" type="checkbox"/> Resident fish <input type="checkbox"/> Wildlife	<input checked="" type="checkbox"/> Multi-year (milestone-based evaluation) <input type="checkbox"/> Watershed project evaluation	<input type="checkbox"/> Watershed councils/model watersheds <input type="checkbox"/> Information dissemination <input type="checkbox"/> Operation & maintenance <input type="checkbox"/> New construction <input checked="" type="checkbox"/> Research & monitoring <input type="checkbox"/> Implementation & management <input type="checkbox"/> Wildlife habitat acquisitions

## Section 3. Relationships to other Bonneville projects

***Umbrella / sub-proposal relationships.*** List umbrella project first.

Project #	Project title/description
9701901	North Fork Malheur River Bull Trout and Redband Trout Life History Study

#### ***Other dependent or critically-related projects***

Project #	Project title/description	Nature of relationship
9405400	Bull Trout Genetics, habitat Needs, L.H. Etc. in Central and NE Oregon	Life History

## Section 4. Objectives, tasks and schedules

#### ***Past accomplishments***

Year	Accomplishment	Met biological objectives?
97	17 miles of stream survey Summit Creek.	under review

97	Fish Survey's conducted on Wolf Creek, East Fork Wolf Creek.	Met objectives for these streams.
98	Spawning surveys conducted on West Fork Big Meadow Creek, Lake Creek.	Yes
98	Fish Survey's conducted on Crooked Creek and McKoy Creek; bull trout found on Crooked Creek (bull trout are considered "not present" in this drainage).	Met objectives for these streams.
98	30 miles of stream survey on Wolf Creek and East Fork Creek	under review
98	Thermograph data (FY97 and 98)	Met annual objectives

### ***Objectives and tasks***

<b>Obj 1,2,3</b>	<b>Objective</b>	<b>Task a,b,c</b>	<b>Task</b>
1	Document the complete migratory patterns of bull trout in the Middle Fork Malheur River and Warm Springs Reservoir	a	Radio tag 20 bull trout and PIT tag about 100 bull trout throughout the basin and track migration patterns using radio telemetry and recapture methods respectively
1		b	Hook and line survey for juvenile and subadult bull trout in tributaries; PIT tag up to 60 in tribs and monitor possible movement back to reservoir through the use of a screw trap set below major spawning areas.
1		c	Recapture PIT tagged fish in the screw trap and recapture PIT tagged fish in the trap nets and fyke nets in reservoir
2	Determine population trends and age class structures in bull trout and redband trout	a	Continue monitoring spawning activity in documented areas and any new areas identified through the use of radio telemetry
2		b	Determine population trend of adult bull trout spawners by past and present spawning surveys
2		c	Gather scale samples from 30 bull trout and redband trout caught in trap nets at reservoir sites; gather 30 scale samples from fish caught in the screw trap located on the mainstem Middle Fork and 30 bull and redband trout captured in tributaries.

3	Determine water quality parameters in Middle Fork Malheur	a	Continue using thermographs to gather data on established sites.
3		b	Correlate FLIR data with thermograph information
4	Determine the timing of spawning and preferred spawning sites	a	Continue monitoring the locations and timing of bull trout spawning activities via radio telemetry in the Middle Fork Malheur and tributaries.
4		b	GPS all redds counted in the spawning surveys and enter into GIS to determine spawning site preference
5	Determine bull trout use of Warm Springs Reservoir and fish entrainment	a	Track all radio tagged bull trout in Warm Springs Reservoir until migration occurs
5		b	Determine if fish entrainment over the dam by fish sampling below the dam
6	Evaluate the habitat profile of critical bull trout spawning and rearing tributaries of the Middle Fork Malheur River	a	Stream survey using ODFW 1998 protocol; approximately 30+ miles of tributaries will be surveyed
6		b	Electroshock streams which have suspected or potential bull trout populations
7	Determine the genetic variability of redband trout within the Middle Fork Malheur River and Warm Springs Reservoir	a	Gather 60 samples from the Middle Fork tributaries, 60 from the screw trap located in the mainstem, and 60 samples from Warm Springs Reservoir that are to be analyzed by the University of Washington
8	Determine cold water micro-refugia within the Middle Fork Malheur Basin	a	Identify areas of cold water and stream temperature profiles using Forward Looking Infrared (FLIR) videography within the Middle Fork Malheur River (~ 60 miles)
8		b	Snorkel cold water micro-habitats identified in 8a and determine bull and redband trout utilization.
9	Progress Reports	a	Write technical, quarterly and annual reports.

### **Objective schedules and costs**

<b>Obj #</b>	<b>Start date mm/yyyy</b>	<b>End date mm/yyyy</b>	<b>Measureable biological objective(s)</b>	<b>Milestone</b>	<b>FY2000 Cost %</b>
1	4/2000	4/2001	Rate and timing of movement throughout the Middle Fork basin	x	19%
2	4/2000	4/2001	index of adult spawners and age class from scale samples	x	9%
3	4/2000	4/2002	water quality throughout subbasin	x	9%
4	4/2000	4/2002	timing of spawning activities	x	4%
5	4/2000	4/2001	fish distribution and entrainment at Warm Springs Reservoir	x	10%
6	4/2000	4/2002	habitat conditions	x	31%
7	4/2000	4/2002	genetic variability between populations within the Middle Fork subbasin	x	3%
8	4/2000	4/2002	temperature profiles of the Middle Fork river and tributaries	x	7%
9	4/2000	3/2003	Progress Reports	x	8.00%
				<b>Total</b>	<b>100.00%</b>

### **Schedule constraints**

Weather

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### **Completion date**

2002

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## **Section 5. Budget**

**FY99 project budget (BPA obligated):** \$199,785

### ***FY2000 budget by line item***

<b>Item</b>	<b>Note</b>	<b>% of total</b>	<b>FY2000</b>
Personnel	2 Biologist @15.35/hr, 1 mitigation coordinator @ 14.31/hr and 2	%43	87,225

	Fisheries Technicians @ 8.50/hr		
Fringe benefits	25% of salaries	% 11	21,807
Supplies, materials, non-expendable property	Includes office supplies	% 3	6,350
Operations & maintenance	None	% 0	0
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	None	% 0	0
NEPA costs	None	% 0	0
Construction-related support	None	% 0	0
PIT tags	# of tags: 100 - 14mm tags	% 0	290
Travel	130 miles/day X 4 days/week @ \$0.32/mile	% 5	9,216
Indirect costs	Overhead	% 18	35,716
Subcontractor	Oregon Department of Fish and Wildlife -- Analyze 40 miles of stream survey data @ 160/mile	% 3	6,400
Subcontractor	FLIR flights	% 5	10,000
Subcontractor	University of Washington -- Analyze 180 redband genetic samples	% 6	11,700
Other	Lease on vehicles	% 6	12,480
<b>TOTAL BPA FY2000 BUDGET REQUEST</b>			<b>\$201,184</b>

### ***Cost sharing***

<b>Organization</b>	<b>Item or service provided</b>	<b>% total project cost (incl. BPA)</b>	<b>Amount (\$)</b>
Oregon Department of Fish and Wildlife	Field equipment, 1 full time seasonal technician and 2 part/time (according to seasonal activity), 1 biologist in-kind	% 10	30,000
Bureau of Reclamation	2 data loggers, field equipment and funding for additional technical support	% 10	30,000
US Forest service (Prairie City Ranger District)	Field equipment, 1 part/time seasonal technician and 2 part time (according to seasonal activity) biologists in-kind	% 10	30,000
Bureau of Land Management	Funding for project	% 2	5,000
Trout Unlimited	In-kind services	% 0	1,000

Oregon Trout	In-kind services	%0	1,000
<b>Total project cost (including BPA portion)</b>			\$298,184

### ***Outyear costs***

	<b>FY2001</b>	<b>FY02</b>	<b>FY03</b>	<b>FY04</b>
<b>Total budget</b>	\$200,000	\$124,000	\$0	\$0

## **Section 6. References**

<b>Watershed?</b>	<b>Reference</b>
<input type="checkbox"/>	Bond, C.E. 1992. Notes on the nomenclature and distribution of the bull trout and effects of human activity on the species. Pages 1-4 in P.J. Howell and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain bull trout Workshop. Oregon chapter AFS
<input type="checkbox"/>	Bowers, W.L., P.A. Dupee, M.L. Hanson, and R.R. Perkins. 1993 bull trout population summary Malheur River basin. Oregon Department of Fish and Wildlife, hines, Oregon. Unpublished report.
<input type="checkbox"/>	Buchanan, D.M., M.L. Hanson, R.M. Hooton. 1996. 1996 Status of Oregon's Bull Trout. Draft Report. Portland, OR
<input type="checkbox"/>	Buckman, R.C., W.E. Hosford, P.A. Dupee. 1992. Malheur River bull trout investigations. Pages 45-57 in P.J. Howell and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the American Fisheries Society.
<input type="checkbox"/>	Fulton, L.A. 1968. Spawning areas and abundance of chinook salmon <i>Oncorhynchus tshawytscha</i> in the Columbia River basin-past and present. USFW, Special Scientific Report, Fisheries 571, Washington, DC
<input type="checkbox"/>	Fulton, L.A. 1970. Spawning areas and abundance of steelhead trout and coho, sockeye, and chum salmon in the Columbia River basin-past and present. USFWS, Special Scientific Report, Fisheries 618, Washington, DC
<input type="checkbox"/>	Howell, P.J. and D.V. Buchanan, editors. 1992. Proceedings of the Gearhart Mountain bull troutworkshop. Oregon Chapter of the American Fisheries Society, Corvallis
<input type="checkbox"/>	Kostow, 1995 (editor). 1995. Biennial report on the status of wild fish in Oregon. Oregon Department of Fish and Wildlife publication.
<input type="checkbox"/>	Leary, R.F., F.W. Allendorf, and S.H. Forbes. 1993. Conservation genetics of bull trout in the Columbia and Klamath river drainages. Conservation Biology 7(4):856-865
<input type="checkbox"/>	McLeod, C.L. and T.B. Clayton. 1997. Use of radio telemetry to monitor movements and obtain critical habitat data for a fluvial bull trout population in the Athabasca River, Alberta. Pages 413-420 in Mackay, W.C., M.K. Brewin, and M. Monita, editors.
<input type="checkbox"/>	Pribyl, S.P. and W.E. Hosford. 1985. Malheur basin wild trout evaluation. Information River subbasin. Draft Report. ODFW, Portland.

<input type="checkbox"/>	<p>Ratliff, D.E. and P.J. Howell. 1992. The status of bull trout populations in Oregon. Pages 10-17 in P.J. Howell and D.V. Buchanan, editors. Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter of the AFS. Corvallis, OR</p> <p>Note *1</p>

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## PART II - NARRATIVE

### Section 7. Abstract

Past land use practices and construction of hydroelectric facilities have degraded the Middle Fork Malheur River to the point where survival of the remaining native salmonids are severely threatened. The goal of this project is to gain an understanding of the life history and genetic composition of the native salmonids in the Malheur River Basin. Little information is currently available concerning native trout populations, seasonal distribution and movements throughout the Middle Fork Malheur River. What information there is on this area indicates that bull trout *Salvelinus confluentus* and redband trout *Oncorhynchus mykiss gairdneri* populations are severely threatened. This project outlines a plan to assess habitat conditions, salmonid population structure and dynamics through the use of radio telemetry, screw traps, habitat assessments and genetic analyses. This project will assist us in achieving the goals and objectives defined in the Northwest Power Planning Council's 1994 Columbia River Fish and Wildlife Program. This project also complements the management plans outlined in the Oregon Department of Fish and Wildlife's Malheur Management plan of 1990. Assessment of these surveys will be the basis of recommendations for enhancement and protection strategies that are in line with council measures. Implementation of these strategies will provide the native salmonids with suitable habitat and increase population numbers.



## Section 8. Project description

### a. Technical and/or scientific background

The headwaters of the Middle Fork Malheur is located on the south slope of the Strawberry Mountains, approximately 200 river miles (RM) upstream from the Snake River. Several tributaries converge at the southern edge of Logan Valley, where they form the mainstem of the Middle Fork Malheur. Most of the research is to be conducted from Warm Spring Reservoir, upstream 72 miles to the headwaters of the Middle Fork Malheur Basin.

Historically, the Paiutes tribe collected anadromous fish from Stinkingwater Creek, a tributary to the Middle Fork Malheur. Anadromous salmon and steelhead historically, spawned in the upper Malheur basin (Fulton 1968,1970). The construction of Warm Springs Dam in 1919 on the Middle Fork Malheur effectively ended the migration of anadromous fish from the Middle Fork. Construction of the Brownlee Dam in 1958, on the Snake River, has prohibited the migration of anadromous fish from the entire upper Snake River basin (Pribyl and Hosford, 1985). The result is a drastically altered environment, causing significant losses to the Paiute people, as well as to other aquatic and terrestrial wildlife in the region that depended on the salmon for subsistence. The Malheur Basin is within the usual and accustomed use area of the Burns Paiute Tribe.

In addition to the loss of anadromous fish in this area, resident fish have also suffered significant habitat loss and degradation due to land-use factors such as timber harvest, livestock production and irrigation withdrawals. Bull trout *Salvelinus confluentus* have specific environmental requirements and complex life histories making them especially susceptible to human activities that alter their habitat (Howell and Buchanan 1992). For some time, it has been known that bull trout populations have been declining throughout their range (Howell and Buchanan, 1992; USDA (2), 1993; Kostow, 1995). Information from long time residents in the area, indicates that bull trout were taken as far downstream as Wolf Creek (RM 168) in 1955 when both the North and Middle Forks of the Malheur were chemically treated (Bowers, *et. al.*, 1993). In 1993 Bowers *et. al.*, noted from the surveys conducted in the Middle Fork Malheur Basin that bull trout were found only in the tributaries Lake Creek (RM 195) and Big Creek (RM190). Ratliff and Howell, in 1992, listed habitat degradation as the primary cause for depletion of bull trout in this area.

Bull trout were held in low regard by anglers and fishery managers due to its supposedly poor fighting qualities and piscivorous habit (Bond, 1992). The Oregon Department of Fish and Wildlife has no record of stocking brook trout *Salvelinus fontinalis* in the Middle Fork Malheur. According to the ODFW, brook trout fry were stocked by pack train in the 1930s by sheepherder volunteers in exchange for free hunting and fishing licenses (Bowers *et. al.*, 1993). Brook trout pose a serious threat to bull trout populations due to habitat competition and their ability to hybridize with bull trout resulting in a loss

of genetic integrity (Ratliff and Howell, 1992; Leary, *et. al.*, 1983). These brook trout may already be in part responsible for the loss of bull trout in some areas and represent a threat to them throughout most of the remainder of their range in the Middle Fork Malheur drainage. In 1997, tribal fish surveys on the Middle Fork tributary, Summit Creek, indicated that the majority of the brook trout concentrations are in direct conflict with bull trout habitat. The ODFW has an umbrella project titled *Feeding Ecology of Bull Trout versus Brook Trout*. Research is to determine feeding behavior of bull trout in the presence of brook trout in the Middle Fork basin. Furthermore, the Warm Springs dam on the Middle Fork and Agency dam on the North Fork Malheur prohibits the migration of adfluvial fish causing additional genetic losses (Buckman, *et. al.*, 1992). Historically, frequent interaction between bull trout in both forks is supported by a genetic study that found these bull trout are more closely related to each other than to any other inland population of bull trout (Spruell and Allendorf, 1997).

Four distinct life history patterns of bull trout have been identified:

- (1) the anadromous form in which the adult migrates from marine to stream habitat to spawn,
- (2) the adfluvial form in which the adult migrates from lakes to streams to spawn,
- (3) the fluvial form in which the adult migrates from large rivers to small streams to spawn, and
- (4) the resident form in which the adult remains and spawns in small streams.

It is not known if these (Malheur Basin) bull trout are all fluvial or a combination of fluvial and resident life history patterns (Buchanan *et. al.*, 1996). Current abundance, recruitment, age class structure, and growth rates for bull trout are also unknown at this time (Bowers *et. al.*, 1993). It is critical to have a good understanding of status, seasonal distribution, and overall life history of bull trout in order to develop a restoration plan. The intention of this project is to gain a defensible and scientific knowledge of bull and redband trout, identify critical habitat, and prioritize restoration efforts.

Following the recent decision in June 1998, bull trout in the Columbia River Basin have been listed as a threatened species under the Federal Endangered Species Act. Bull trout are in serious risk of extinction in the Middle Fork Malheur (ODFW 1996). Given the status of bull trout and their sensitivity to habitat degradation, research objectives and efforts will have a stronger emphasis on bull trout. The Malheur National Forest Plan designates bull trout as an indicator species for non-anadromous fish and riparian habitat in the forest. The assumption is that management activities that affect bull trout will affect a variety of other species in the same or similar habitat. Accordingly, measures to protect the indicator species will protect other species as well (Buckman, *et. al.*, 1992).

The taxonomy and classification of redband trout *Oncorhynchus mykiss gairdneri* has in the past been in a state of controversy. However, Behnke, in 1992, stated that "For fisheries management, the major significance of separate evolutionary lines leading to coastal rainbow and interior redband trout does not concern correct taxonomy. Rather it concerns differences in the adaptive specialization the two forms have acquired over

several thousands of years and how these differences can be accommodated in management programs.” In particular, redband trout are adapted to harsh arid environments (Wishard, *et. al.*, 1984). Habitat degradation, as well as possible genetic deterioration, are the primary causes for the depletion of redband trout in the region.

Construction of Warm Springs dam on the Middle Fork, Agency dam on the North Fork Malheur and the Brownlee dam on the Snake, has interrupted natural gene flow within the population (Pribyl and Hosford, 1985) in addition to the stocking of non-native trout that were stocking in the region. Protein work done by Ken Currens in 1996 demonstrated that there was number of populations in the Snake River and Harney Basin that have diverged from the typical ranges of the allele frequencies found inland rainbow trout of the Columbia River. He suggested that this could be one of two things; possible hybridization with non-native trout, or that these native populations may be more diverse than previously assumed. The redband trout in the Malheur River system are not listed, but their future and well being is of special concern.

#### **b. Rationale and significance to Regional Programs**

The Pacific Northwest Electric Power Planning and Conservation Act of 1980 called for recommendations of to develop a program to protect, mitigate, and enhance fish and wildlife on the Columbia River and its tributaries that were affected by the development of hydroelectric activity. In 1997, the Burns Paiute Tribe (BPT), with funding provided by Bonneville, began developing a Fisheries Natural Resources Department with the intent to recover and preserve the health of native resident fish in the Malheur Basin. This project is a habitat and life history study designed to record the movements, seasonal patterns of bull and redband trout.

This study would comply with the following measures in the Columbia River basin fish and Wildlife Program 1994:

- (1) Resident fish Goal to recover and preserve health of native resident fish injured by hydropower system (measure 10.1),
- (2) Fund the fishery managers' efforts to complete assessments of resident fish losses throughout the Columbia River Basin (measure 10.1A.1),
- (3) Accord high priority to areas of the basin where anadromous fish are not present (measure 10.2A.1),
- (4) bull trout mitigation (measure 10.5),
- (5) study and evaluate bull trout populations (measure 10.5A) and,
- (6) other resident fish populations (measure 10.6).

According to the program, the council believes these studies and evaluation should be undertaken and completed, quickly, and on-the-ground projects identified and

implemented as soon as possible to address the needs of this species. In addition, these studies should be coordinated to avoid redundant work to increase the learning potential.

Following the recent decision in June 1998, bull trout in the Columbia River Basin have been listed as a threatened species under the federal Endangered Species Act. The US Fish and Wildlife Service (USFWS) is currently in the process of developing Biological Opinion Document relative to bull trout which should be completed by early 1999.

We are working with the USFWS to insure that our research complies with the Endangered Species Act. We have received a Section 10 Permit from the USFWS authorizing our department biologist to conduct and fulfill our contract obligations.

The Oregon Wild and Scenic Rivers Act of 1988 added a portion of the Malheur River to the National Wild and Scenic Rivers System. The designated section runs from the southern end of Logan Valley near Bosenberg Creek to the Malheur National Forest boundary (USDA 1993). A 1993 presidential directive launched the Interior Columbia Basin Ecosystem Management project (ICBEMP). Several Federal agencies teamed to develop a scientifically sound, ecosystem-based strategy for 72 million acres of land administered by the BLM and USFS. Land managers are using the information derived from ICBEMP to develop management strategies that will address broad scale issues such as the conservation and recovery of bull trout.

### **c. Relationships to other projects**

We have developed a good working relationship with several projects and agencies during the course of our research. We are currently working on coordinating our research projects in eastern Oregon into an Umbrella project that would cover all other bull trout life history studies.

*The Stinkingwater Project* (project #9701900) and *North Fork Malheur River Bull Trout and Redband Trout Life History Study* (project #9700) are two similar projects, both with the same general objectives and tasks. The difference between the two research projects is that they are conducted in two isolated river basins. Due to the presence of brook trout in only one of these basins, conducting the two studies in the neighboring river basins will provide a better understanding of bull trout behavior and better basis for future management decisions. These projects are in the process of being combined into one through our contracting officers.

The Malheur Wildlife Mitigation Site (project number 9106) is expected to acquire critical fish and wildlife habitat in the Malheur basin. The land will include ~7 miles of riverine habitat. A future acquisition of Logan Valley will play a significant role in restoring bull trout in the Middle Fork (project submitted in FY1999 for funding in FY2000).

Other projects we have related our efforts to is the Bull Trout Genetics, Habitat Needs, Life History, Etc. In Central and NE Oregon (project #9405400). The Burns Paiute

Tribe assisted ODFW in completing objective five of their contract, characterization and interactions between bull trout and introduced brook trout. We will continue to assist in their efforts and work together on data exchanges.

**d. Project history** (for ongoing projects)

The Stinkingwater Project was to originate in the Middle Fork Malheur basin. This is due to the presence of brook trout in the Middle Fork; research efforts were directed towards the North Fork, which has no brook trout. This decision is based on the perception that research conducted in the North Fork would allow the Tribe to study bull trout behavior where there is no competition from brook trout. The Stinkingwater project will be combined with the North Fork Malheur River bull Trout and Redband Trout Life History Study (Project # 9107). The new title of this project is *Evaluate the Life History of Native Salmonids in the Malheur Basin*.

Although we have been working on both drainages, most of our efforts have concentrated on the North Fork. Past accomplishments in section 4 reflect work conducted in the Middle Fork basin only. The action to amend our existing contract was approved by the Resident Fish Managers and the Bonneville Power Administration on December 15, 1997.

**e. Proposal objectives**

This is a proposal is to coordinate current activities, and to implement additional activities leading to a reasonably high degree of knowledge concerning redband and bull trout life history patterns in the Malheur River basin, with emphasis on bull trout. At this time, relatively little is known about these fish. Considering both the biological and political sensitivity surrounding the management of bull trout habitat, a clear understanding of their life history patterns is essential to prescribe defensible land management decisions and activities.

In general, this project will coordinate the continuation of work to be completed by six (or more) different agencies and organizations through the fiscal year 2000. The proposal integrates past work by various universities and government agencies and incorporates this into a comprehensive program of work through the next three years for both the Middle Fork and North Fork Malheur River system.

**Objectives**

1. Document the complete migratory patterns of bull trout in the Middle Fork Malheur River and Warm Springs Reservoir.
2. Continue monitoring population trends (index) and age class structure in bull trout and redband trout.
3. Monitor water quality.
4. Determine the timing of bull trout spawning.

5. Determine the premigration use by bull trout in Warm Springs Reservoir and the entrainment over the dam.
6. Evaluate habitat profile of critical bull trout spawning and rearing tributaries on the Middle Fork Malheur River.
7. Continue quantifying genetic population structure in redband populations.
8. Determine cool micro-refugia within the Middle Fork Malheur River
9. Progress Reports.

## **f. Methods**

This project will use various methods to achieve the project objectives, including; 1) the installation screw traps, 2) Use of PIT tags and micro-radio transmitters to track fish movement, 3) annual spawning surveys (redd counts), 4) use of Forward Looking Infrared (FLIR) videography, 5) fish capture and tagging in Beulah Reservoir, 6) ODFW Stream Habitat Surveys, and 7) the compilation and evaluation of existing water temperature data.

Basic setup and operation of the project will start in early spring, depending on weather. Fyke nets and Trap nets will be set in Warm Springs Reservoir to catch bull and redband trout. This will be the first year traps will be set out to catch fish. A combination of nine 2cm trap and Fyke nets will be placed in strategic places in the reservoir. Personnel will operate a boat and check these traps every other day. Scale samples, lengths and weights will be taken on bull trout that are captured. Furthermore, bull trout larger than 395 grams will have a radio implanted into them and those that do not meet the minimum weight will be PIT tagged. Tissue samples, scale samples, lengths and widths will be taken on redband trout captured in the nets. PIT tags will also be put into redband trout larger than six inches and it is possible that radio tags will be implanted. The nets will be pulled out of the reservoir once a minimum of 20 bull trout are implanted with radios.

Two screw traps will be placed in strategic sites on the Middle Fork Malheur River. Screw traps will operate between May/June to September/October. Personnel from the Tribe, ODFW, or Forest Service will check the trapped daily. Data will be taken on all fish species caught in these traps. Lengths, weights, scales and tissue samples will be taken on bull and redband trout. Target fish will be checked for PIT and radio tags. If neither tag is found, radio or PIT tags will be implanted into trout species according to the specifications mentioned in the previous paragraph. Only the lengths of all other species will be recorded.

With the use of radio telemetry, radio tagged fish will be tracked by foot, boat, plane and vehicle. Personnel from the ODFW, Forest Service and the tribe will track the fish and document the location of the fish with a hand held GPS unit. Fish will be tracked every three to five days. The use of radio telemetry has been demonstrated in past studies to be an effective and efficient resource used to determine behavioral characteristics and important habitats of bull trout utilizing a large river system (Mackay et. al., 1997).

Migratory patterns of bull trout in the Middle Fork Malheur basin will be documented by the use of PIT tags and radio tags (Objective 1). Identification of critical life stages of bull and redband can be determined from the recapture of tagged fish in the trap nets, Fyke nets, and upstream screw traps. Critical life stages such as the age of migration or recruitment into the adult population, and the age class of juvenile bull trout in Warm Springs Reservoir. The assumption is juvenile bull trout will not migrate out of the reservoir until they are ready to spawn. The age of recruitment can then be determined by small fish that were PIT tagged in the reservoir are recaptured in the upstream screw traps.

Hook and line samples of bull trout captured in the tributaries will be PIT tagged. Downstream migration can be determined by the recapture of bull trout in the downstream screw trap. The age class for juvenile bull trout that are migrating downstream can also be determined. Overall, the recapture of PIT tagged fish will provide downstream and upstream migration patterns juvenile and subadult bull trout. Trap nets and Fyke nets will also identify the dominant juvenile age class for bull trout in the reservoir.

Seasonal distribution and time of movement of bull trout will be determined by radio telemetry, PIT tags, and snorkeling (Objective 1). Radio tagged fish caught in the reservoir trap nets and Fyke nets will be tracked at least once every three days to five days, depending on accessibility. The location of the fish will be documented by a unit assigned by the Global Positioning System (GPS). If radio tagged fish remain in the same location, they will be investigated for possible mortality or radio abortion. If needed, snorkeling will be done to observe the fish or find the radio. If the fish is found alive, the site will be defined as a “preferred site” and habitat notes will be taken using ODFW protocol (Objective 6).

Radio telemetry and fish sampling will be used to determine bull trout use of Warm Springs Reservoir (Objective 5). Radio tagged fish capture in the Fyke and trap nets will be tracked from time of radio installation to until they leave the reservoir. Fish will be tracked by boat, and a GPS unit will be taken to document the location of the radio tagged fish. Entrainment over the dam will also be monitored by periodic fish sampling below the dam.

For the past five years, ODFW have been leading the spawning surveys on the North Fork and Middle Fork Malheur system. These fish will be tracked via radio telemetry to the headwaters and personnel will monitor these fish for any spawning activity (Objective 4). Once activity is noted, personnel from the ODFW, Forest Service, the Tribe and volunteers will walk streams and count bull trout Redds. Once a redd is identified, a GPS unit will document the location. When surveys are completed, the GPS units associated with all redds observed will be entered on Geographic Information System (GIS) to determine preferred spawning sites based on the density of individual redds (Objective 4).

A population trend and age class structure for bull trout in the Middle Fork Malheur basin will be conducted (Objective 2). ODFW will use spawning surveys to monitor and determine population trend of bull trout spawners. This project will allow the Tribe to assist ODFW with future spawning surveys. ODFW also conducts population surveys on various lakes in the region, including Warm Springs Reservoir. Samples are collected with gill nets at sites set by ODFW. Nets will be set late in the evening and deployed early in the morning to minimize mortality of fish trapped in the nets. In recent years, this lead to great success in reducing mortality by promptly releasing fish caught in nets. Under the cooperation of ODFW, the tribe will assist in the survey done in Warm Springs Reservoir.

Scale samples from bull and redband trout caught in the trap nets, fyke nets, screw traps, and fish sampling efforts will be sent into ODFW for age class analysis (Objective 2). A total of 60 scale samples will be collected from traps in the reservoir, 30 samples per target species. This same sample size will be collected from the upstream screw trap in the mainstem Middle Fork and from headwater tributaries. All together, a total of 180 scale samples will be collected and sent for analysis.

Forward Looking Infrared (FLIR) videography via aircraft will be conducted on 40 miles on the Middle Fork Malheur and will determine areas of cool water microhabitat (Objective 8). These flights will be conducted during August, when stream temperatures are at their summer peak. These photos can differentiate between warmer and colder waters. Though photos were taken in FY98 and proposed for FY99, more photos are required due to the variation in the intensity of summer season. Areas of cool water pockets within a surveyed drainage will be identified from past and present photos. It is suspected that bull and redband trout use these microhabitats or refugia to escape the warm stream temperatures of mid-summer. The identified cool water microhabitats will be snorkeled to verify the utilization by bull and redband trout.

Onset Hobo stream temperature monitors and FLIR flights will be used to determine water quality (Objective 3). US forest service and ODFW will monitor most of the stream temperature sites. The Tribe will be responsible to monitor the remaining temperature sites that are not covered. Stream temperature data from these thermographs will be correlated with the FLIR flights.

Summer crews will collect stream habitat data using ODFW protocol. This will determine overall habitat conditions on the reach level (Objective 6). Thirty to forty miles are targeted for survey in FY 2000. The use of historical and recent temperature data from the Middle Fork Malheur Basin will be used to correlate with the habitat data.

Presence/absence surveys will be conducted on streams that have the potential or suspected to have bull trout populations (Objective 6). The Tribe and counterparts will designate streams that will be sampled by electrofishing. This will further refine the current distribution of bull trout in the Middle Fork Malheur. Electroshocking efforts will cease within the drainage once a bull trout is identified. This action is necessary to comply with the USFWS guidelines on listed bull trout.



A genetic analysis on redband trout will be conducted on tissue samples gathered throughout the project (Objective 7). Sixty samples will be taken from the reservoir with the use of Fyke Nets and Trap Nets, sixty samples from the mainstem Middle Fork with the use of the screw traps, and sixty samples from the tributaries with the use of angling gear. A total of 180 samples will be sent to the University of Washington for analysis. Upon completion of our project, we will be able to compare and better define any genetic variation within the system.

The Tribe will document the progress and findings of the research in technical, quarterly, and annual reports (Objective 9).

**g. Facilities and equipment**

Equipment required to implement research on this project would include:

- (1) 18-foot jet sled boat, motor and trailer,
- (2) office facilities,
- (3) two 4x4 pickups,
- (4) backpack electroshocker,
- (5) three computers and appropriate software (Microsoft Office, ArcView),
- (6) radio telemetry gear,
- (7) two screw traps,
- (8) combination of 8 Trap nets and Fyke nets,
- (9) eight Hobo Stream Temperature gauges with cases,
- (10) snorkeling gear, and
- (11) two hand held GPS units

The above equipment list are required in order to meet the objectives described above in section 8f. Major costs will include item (2) office facilities, and item (3) lease payments due on the vehicles. Besides these two items, there is no major purchase cost for equipment and facilities for FY2000.

**h. Budget**

**Personnel**

**1 Program Leader** - GS-9 equivalence  
 $\$16.80 \text{ hr} \times 2080 \text{ hrs/yr} = \mathbf{\$34,944}$

**1 Fish Biologist** – GS-7 equivalence  
 $\$13.90 \text{ hr} \times 2080 \text{ hrs/yr} = \mathbf{\$28,912}$

**2 Seasonal Fisheries Technicians** – GS-3/4 equivalence

$\$8.50 \text{ hr} \times 1080 \text{ hrs/yr.} = \mathbf{\$18,360}$

**Mitigation Coordinator**

$\$14.31 \text{ hr} \times 350 \text{ hrs/yr.} = \mathbf{\$5,009}$

**Fringe Benefit**

25% of salaries.

**Supplies, materials, and non-expendable property**

Office expenses consist of the following; telephone, electrical costs, postage, office supplies, insurance, E-mail fees, and photo development. Cost estimate is **\$6,375.**

**Travel**

-Travel is required for personnel to arrive at the study site. Two crews will travel to and from the project area four days out of the week. This dollar amount was calculated for the average driving distance to and from work sites during the field season.

-Average miles travel/day = 120 miles x 4 day/ week X 30 weeks @ \$.32/ mile = 4,800 (one vehicle) X 2 (crews) = **\$9,216.**

**Indirect Costs**

-Our Tribal Government sets this percentage at 26%.

**Subcontracts**

-Subcontractors will conduct specialized tasks in order to meet our objectives.

1) Flight Imagery Infrared (FLIR) Videography. – The US forest service contracted these flights as a cost-share contribution in FY98. The Tribe will be responsible to subcontract these flights for FY2000. Estimated costs will be **\$10,000.**

2) University of Washington is currently the agency we will use to evaluate our redband genetic samples. We prediction gathering 180 samples within the Middle Fork drainage in the year 2000. Total cost for this service is estimated at \$65/sample with report. Cost = **\$11,700.**

3) The Oregon Department of Fish and Wildlife will enter, analyze, and GIS stream survey data. They will also provide training for Tribal personnel to become proficient in the area. Forty miles of stream survey are to be completed in the Middle Fork basin in FY2000. Total cost for this service @ \$160/mile = **\$6,400.**

**Other - Lease Payment on Vehicles**

-Quarterly lease payments of \$1,560 are due on both vehicles. Total cost =  
**\$12,480**

**Note \*1 References** (could not enter in above section due to disk error)

Spruell, P. and F.W. Allendorf. 1997. Nuclear DNA analysis of Oregon bull trout. ODFW Report 97/5. Portland, OR

USDA 1993. Malheur Wild and Scenic River Management Plan. USDA, Pacific Northwest Region. John Day, Oregon.

**Section 9. Key personnel**

Name: Dan Gonzalez

Title: Fish and Wildlife Program Leader

Months funded by this project: 12

Education: Oregon State University; BS in Fisheries Science (1995) and Wildlife Science (1996)

Name: Lawrence Schwabe

Title: Fish Biologist

Months funded by this project: 12

Education: Oregon State University; BS in Fisheries Science (1995)

**Section 10. Information/technology transfer**

The Tribe will document the findings of the research in technical, quarterly and annual reports. All reports and associated data will be compiled for a final report on the life history of bull trout and redband trout in the Middle Fork Malheur River. Through our cost share agreement partners, the data we produce will be used to define better management strategies to enhance the population and survivability of bull trout within the basin. A complete report will be submitted to the Bonneville Power Administration, US Forest Service, Bureau of Reclamation and the Bureau of Land Management for implementation towards their land management practices. This information will also be used to set management strategies of future Tribal properties. The Burns Paiute Tribe is currently proposing to acquire a significant piece of property that holds two headwater streams of the Middle Fork Malheur River and a lower section of the mainstem Malheur River about 19 miles below the North Fork River confluence.

**Congratulations!**